

Research Paper ■

Who Uses the Patient Internet Portal? The PatientSite Experience

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Abstract **Objective:** Although the patient Internet portal is a potentially transformative technology, there is little scientific information about the demographic and clinical characteristics of portal enrollees and the features that they access.

Design: We describe two pilot studies of a comprehensive Internet portal called PatientSite. These pilots include a prospective one-year cohort study of all patients who enrolled in April 2003 and a case-control study in 2004 of enrollees and nonenrollees at two hospital-based primary care practices.

Measurements: The cohort study tracked patient enrollment and features in PatientSite that enrollees accessed, such as laboratory and radiology results, prescription renewals, appointment requests, managed care referrals, and clinical messaging. The case-control study used medical record review to compare the demographic and clinical characteristics of 100 randomly selected PatientSite enrollees and 100 nonenrollees.

Results: PatientSite use grew steadily after its introduction. New enrollees logged in most frequently in the first month, but 26% to 77% of the cohort continued to access the portal at least monthly. They most often examined laboratory and radiology results and sent clinical messages to their providers. PatientSite enrollees were younger and more affluent and had fewer medical problems than nonenrollees.

Conclusion: Expanding the use of patient portals will require an understanding of obstacles that prevent access for those who might benefit most from this technology.

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Background

The patient Internet portal is a potentially transformative technology, offering patients unprecedented online access to health information, services, and clinical care. Existing portals offer patients services that include Web links to reliable sources of medical information, and the ability to make appointments, obtain managed care referrals, and request medication renewals. Some sites offer patients electronic access to their own medical records including the physician's problem list, the patient's laboratory and radiology results, and the capability for secure electronic messaging. Although the number of patient portal users is unknown, the number of potential

users is large. In the United States, early portal adopters include Kaiser Permanente (8.2 million members nationally) and the Veterans Affairs health system (4.5 million users, 70 million potentially eligible for services).^{1,2}

The patient Internet portal is spreading rapidly. Health care organizations in California, Georgia, Massachusetts, Michigan, New Jersey, New York, and Pennsylvania offer portals that enable patients to schedule appointments, request prescription renewals, receive laboratory and test results, review their medical records, and obtain an "online consultation" directly with one's physician.³ The U.S. Department of Defense Military Health Services awarded a \$20 million contract to develop an Internet portal that permits patients to create a personal medical history, populated with their medical records, and to send electronic mail to their physician requesting appointments, drug refills, and other information.⁴ Interest in portals extends internationally: Singapore's National Healthcare Group offers a NetCare portal that enables patients to view their online personal medical and health dossier and to make appointment changes and electronic payments.⁵

Despite the promise of improved information, services, and quality of care, evidence suggests that patients who use Internet portals are generally younger, white, more affluent, and healthier than the average patient. Nationally, Internet penetration lags among black and Hispanic populations and individuals with disabilities. Participation rates in these groups were 22% to 24% in 2000, about half that of the general population.^{6,7} However, rates across all population groups have been increasing.⁶ In addition, only 45% of low-income Californians and 36% of other low-income Americans had

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Internet access, compared to 77% and 74% of wealthier Americans. Similar patterns exist for older Americans. While Internet-able seniors are enthusiastic users of health information, only 22% of Americans age 65 or older had Internet access in a February 2004 national survey.⁸ Two thirds of these seniors had looked for medical information online, a 25% increase from 2000.

Does the patient Internet portal primarily serve the “worried well” and health-minded individuals, rather than patients suffering from chronic and serious illnesses? If so, this may affect the willingness of insurers to pay for pilot studies of health information technology and e-visits, of practice managers and health executives to fund these initiatives, and of policy makers to promote this technology in federal and state agencies.⁹

We describe here the results of two pilot studies of a multifeature portal called PatientSite that was introduced at a Boston teaching hospital and its affiliated community practices. We sought to address in this report two related questions. First, what features of the system (such as clinical messaging, laboratory or radiology lookup, referral, appointment, and prescription requests) do patients access most often? Second, what is the demographic and clinical profile of adult primary care patients who choose to enroll in PatientSite?

Methods

PatientSite

PatientSite (www.patientsite.org) was developed by informaticists at Beth Israel Deaconess Medical Center (BIDMC),

a Boston teaching hospital, as “a tool for electronic patient-centered communication” that mitigated shortcomings of traditional e-mail (especially inadequate security) and offered additional patient-centric features.^{10–12} Introduced in April 2000, PatientSite allowed patients to do the following:

- Ask nonurgent questions about care or symptoms using a Web messaging system
- Request an appointment or referral
- Renew a prescription
- Obtain medication information
- Update demographic information, such as phone number or address
- Review radiology, laboratory, and pathology test results
- View and add comments to portions of their medical records

Patients were eligible to enroll in PatientSite if one of their physicians had enrolled in the system. All BIDMC physicians were eligible to enroll in PatientSite, including hospital-based primary care and subspecialty physicians, and an affiliated network of office-based primary care physicians and subspecialists. However, initial recruitment efforts focused on primary care clinicians.

From its introduction in April 2000 through March 2004, 180 physicians at 40 practice sites and 18,435 of their patients enrolled in PatientSite and logged on at least once. This group was defined as “active users” (Fig. 1). Penetration in primary care sites rose most quickly, with 77 (79%) of 97 primary care physicians participating, and 15,504 (11%) of their 135,246

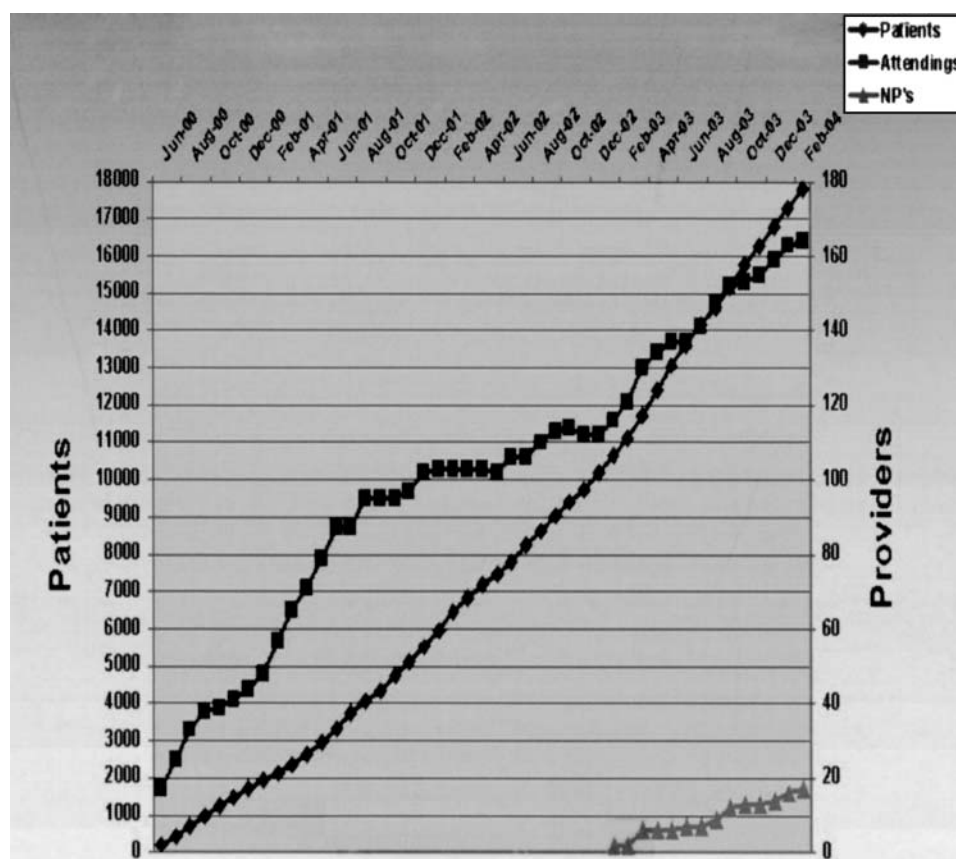


Figure 1. PatientSite active users.

Table 1 ■ PatientSite Utilization by a Patient Cohort Enrolled in April 2003, *N* = 780

	Apr 03	May 03	Jun 03	Jul 03	Aug 03	Sep 03
Patients who logged on each month, no. (%)	598 (76.7)	347 (44.5)	276 (35.4)	268 (34.4)	255 (32.7)	236 (30.3)
Viewed laboratory, no. (%)	384 (49.2)	149 (19.1)	103 (13.2)	100 (12.8)	97 (12.4)	84 (10.8)
Viewed radiology, no. (%)	271 (34.7)	95 (12.2)	70 (9.0)	64 (8.2)	58 (7.4)	54 (6.9)
Sent appointment request, no. (%)	27 (3.5)	14 (1.8)	10 (1.3)	11 (1.4)	7 (0.9)	11 (1.4)
Sent prescription request, no. (%)	36 (4.6)	23 (2.9)	19 (2.4)	17 (2.2)	19 (2.4)	12 (1.5)
Sent referral request, no. (%)	17 (2.2)	17 (2.2)	11 (1.4)	14 (1.8)	5 (0.6)	15 (1.9)
Sent clinical e-mail message, no. (%)	182 (23.3)	119 (15.3)	85 (10.9)	74 (9.5)	61 (7.8)	70 (9.0)

Table 1 ■ (Continued)

	Oct 03	Nov 03	Dec 03	Jan 04	Feb 04	Mar 04
Patients who logged on each month, no. (%)	348 (44.6)	263 (33.7)	213 (27.3)	224 (28.7)	205 (26.3)	235 (30.1)
Viewed laboratory, no. (%)	110 (14.1)	82 (10.5)	67 (8.6)	75 (9.6)	56 (7.2)	96 (12.3)
Viewed radiology, no. (%)	68 (8.7)	48 (6.2)	42 (5.4)	44 (5.6)	37 (4.7)	55 (7.1)
Sent appointment request, no. (%)	11 (1.4)	8 (1.0)	12 (1.5)	13 (1.7)	16 (2.1)	13 (1.7)
Sent prescription request, no. (%)	17 (2.2)	11 (1.4)	21 (2.7)	11 (1.4)	15 (1.9)	19 (2.4)
Sent referral request, no. (%)	12 (1.5)	7 (0.9)	8 (1.0)	10 (1.3)	17 (2.2)	14 (1.8)
Sent clinical e-mail message, no. (%)	78 (10.0)	63 (8.1)	49 (6.3)	65 (8.3)	64 (8.2)	66 (8.5)

primary care patients. Although PatientSite enrollment grew by more than 500 patients per month during this period, participation was uneven within a given practice. In one six-physician primary care practice, for example, two physicians were not enrolled in PatientSite whereas their four colleagues enrolled 36% to 98% of their patient panels. In addition, 28 nurse practitioners were eligible to enroll in PatientSite in 2003. By March 2004, 28 of 231 subspecialists and 18 of 28 nurse practitioners were enrolled.

Data in PatientSite are encrypted and password protected; patients and clinicians must use a confidential password to obtain access to the system. To alert PatientSite users to the presence of a message, PatientSite sends users a traditional e-mail message that they have a PatientSite message, along with a link to the PatientSite Web portal.

The 2003 Healthcare Delivery Solutions Congress recognized PatientSite as one of the most innovative uses of communication technologies to improve patient care. In addition, the Massachusetts Health Data Consortium awarded the PatientSite development team the 2003 "Investing in Information" award.

Study Design and Analysis

To understand the features patients accessed and to characterize the enrollee profile, we present data from two sources.

Cohort Study: Accessing Portal Features

We obtained enrollment data from the Information Systems Department for a prospective cohort study of patients who registered for PatientSite in April 2003. At that time, 13,500 patients at all eligible practice sites were enrolled in PatientSite. All of the 780 patients who enrolled in PatientSite from any eligible practice site in April 2003 were included in the study cohort. Information Systems staff tracked PatientSite use or "hits" on various features within PatientSite prospectively including laboratory and radiology results, prescription renewals, appointment requests, managed care referrals, and clinical messaging.

Case-Control Study: Characteristics of Enrollees and Nonenrollees

To characterize the profile of PatientSite enrollees and to compare them with nonenrollees, we conducted a case-control study in March 2004 of patients at two hospital-based primary care practices. These two practices included 48 full- and part-time physicians and 12 nurse practitioners and served 30,000 adult patients including a large minority and Russian immigrant population. In March 2004, the practices included 2,296 PatientSite enrollees.

We selected 100 PatientSite enrollees (cases) and 100 control patients at random from the two hospital-based primary care practices. To qualify for participation, enrollees must have both enrolled (i.e., registered online for PatientSite) and logged in to the system at least once (i.e., "active users"). We reviewed patients' electronic medical record(s) and abstracted demographic features (age, gender, race, need for interpreter, insurance type), clinical characteristics (number of medications on the patient's medication sheet and number of medical problems on the problem list), and utilization (number of office and emergency department visits and admissions during the previous year).

To compare the profile of PatientSite enrollees and nonenrollees, we used the χ^2 statistic to compare categorical variables and the Wilcoxon rank-sum test for continuous variables. To analyze factors associated with PatientSite enrollment, we created a logistic regression model with forward selection, controlling for age, gender, sex, race, insurance, number of medical problems, and number of prescription medications.

Institutional review board approval was obtained in advance. Analyses used Stata 7.0 statistical software (StataCorp, College Station, TX).

Results

Cohort Study: Accessing Portal Features

To understand how often patients used PatientSite and the features they accessed, PatientSite's developers followed a

Table 2 ■ Demographic, Clinical, and Administrative Characteristics of PatientSite Enrollees and Nonenrollees, March 2004

	Enrollee (<i>n</i> = 100)	Nonuser (<i>n</i> = 100)	p-Value*
Age, yr (range)	42.9 (20–81)	52.9 (21–92)	<0.001
Male gender	33%	44%	0.110
White race	80%	54%	<0.001
Insurance			<0.001
Medicare	2%	21%	
Medicaid	2%	8%	
Uninsured	1%	7%	
Mean no. of medical problems	2.9	7.4	<0.001
Mean no. of prescription meds	2.8	7.2	<0.001
Mean no. of office visits in past year	4.7	8.1	0.002
Mean no. of hospitalizations in past year	0.4	1.5	<0.001

*Wilcoxon rank-sum test for continuous and χ^2 test for categorical variables.

cohort of all 780 patients who enrolled in April 2003. As shown in Table 1, 205 to 598 patients (26% to 77% of the cohort) logged in to PatientSite each month. Radiology reports, laboratory results, and e-mail messaging were the features most often accessed. Patients accessed the system most actively in the first month after enrollment, presumably following an office visit. After one to two months, utilization leveled off.

Case-Control Study: Characteristics of Enrollees and Nonenrollees

We compared the characteristics of PatientSite enrollees and nonenrollees at two hospital-based primary care practices (Table 2). Compared to nonenrollees, more PatientSite enrollees were white and fewer had Medicare or Medicaid insurance. PatientSite enrollees were, on average, 10 years younger than nonenrollees, although 7% of users were at least age 65 (range, 65 to 81). PatientSite enrollees took fewer prescription medications than nonenrollees, had fewer medical problems, fewer office visits in the previous year, and fewer hospitalizations. In a multivariable logistic regression model, nonenrollees were more likely than enrollees to take prescription medications (odds ratio [OR] = 1.1 for each additional medication, 95% confidence interval [CI]: 1.0–1.3), to have more medical problems (OR = 1.1 for each additional problem, 95% CI: 1.0–1.2), and to have no health insurance (OR = 14.2, 95% CI: 1.5–131.4). These findings suggest a “digital divide” between healthy and socioeconomically advantaged PatientSite enrollees and less healthy, less advantaged nonenrollees.

Discussion

In this study of a multifeature patient Internet portal, PatientSite use grew steadily after its introduction. New enrollees logged in most frequently in the first month, but 26% to 77% of the cohort continued to use the portal at least monthly. They most often accessed laboratory and radiology results and the clinical messaging feature. PatientSite enrollees were younger and more affluent and had fewer medical problems than nonenrollees. However, enrollees were not entirely homogeneous. Seven percent of users were at least age 65.

Our study provides useful information about the types of information and services that patients may use online. Given the opportunity, patients access their health record on a regular basis. Further studies are required in order to understand patients’ satisfaction with the type and format of information provided, its accessibility, and its convenience. Our study also shows that younger, healthier patients are most likely to make use of this technology, a finding consistent with previous reports.

In order to close the digital divide in health care, health care leaders must attend to obstacles to Internet enrollment and use by vulnerable patient groups. Although we did not survey physicians about their behaviors, reports indicate that some physicians are careful about whom they agree to interact with electronically. In a survey of 94 primary care physicians in the United Kingdom, 75% of physicians used e-mail with their patients, but a small minority (less than 5%) of patients accounted for all the activity.¹³ Half of respondent physicians estimated that one of four patients would communicate with them by e-mail. Winkelman and Leonard¹⁴ argued that acceptance of the personal health record will require clinicians, patients, and health care organizations to overcome a traditionally physician-centered approach to the medical record and the creation of applications that can be customized to patients’ interests and aptitudes.¹⁵ Evidence is mounting that patients and clinicians value features such as Web messaging.¹⁶ Clearly, maximizing the value of health information technology requires its acceptance by clinicians.¹⁷

This study is subject to several limitations, including the small sample size. Because we studied one Internet portal used by practices affiliated with a single teaching hospital, our results may not be generalizable to other portals or health care systems, practices, or patients. Patients’ use of specific features in PatientSite may reflect idiosyncratic characteristics of the system such as positioning on the screen and ease of access rather than the feature’s value to users.

Nevertheless, our results have good face validity and are congruent with other surveys of Internet use for health information and communication. We believe that the patient Internet portal has the potential to transform the delivery of health care for the better. Expanding the use of patient portals, however, will require a better understanding of the obstacles that prevent access for those patients who could benefit most from this technology.

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